Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Amended) A color quantization method based on the HMMD color space, comprising:

dividing the color space into ~~based on~~ a plurality of differential values (diff) regions along the ~~a~~ diff axis; ~~dividing a lowest diff region of the color space into N equal parts based upon sum regardless of hue wherein the lowest diff region is a gray region and wherein N is a natural number;~~ and

uniformly quantizing ~~dividing the rest of the~~ each diff regions along ~~based upon~~ the ~~a~~ sum axis and ~~a~~ the hue axis.

2. (Amended) ~~The method of claim 1, wherein the lowest diff region centering around the diff axis is determined to be a region of low chroma.~~ A color quantization method based on the HMMD color space, comprising:

dividing the color space into a plurality of differential values (diff) regions along the diff axis;

dividing a lowest diff region of the color space into N equal parts along the sum axis; and

dividing the rest of the diff regions along the sum axis and the hue axis.

3. (Original) The method of claim 1, wherein a longer sum width (a) is selected from both end sum widths (a,b) to be used when partial parts divided by the determined diff values are divided into equal parts by respective given constants based on the sum axis.

4. (Amended) The method of claim 1, wherein the HMMD color space is divided into ~~N~~ M equal parts along ~~based on~~ the hue axis.

5. (Amended) The method of claim 1, wherein the diff regions are divided into 2^x (x is either zero or a positive number) equal parts along ~~based on~~ the sum axis and each of the equal parts divided along ~~based on~~ the sum axis is divided into 2^y (y is either zero or a positive number) equal parts along ~~based on~~ the hue axis.

6. (Amended) The method of claim 1, wherein the diff values range from 0 to 255, and diff values 6, 20, 60, and 110 are preselected to divide the color space along the diff axis, such that the color space is divided into 5 diff regions based on the preselected diff values, wherein the color space is divided into 256 spatial regions by:

dividing the lowest or first diff region into 32 equal parts along ~~based on~~ the sum axis so as to provide 32 spatial regions[[,]];

dividing the second diff region into 8 equal parts along ~~based on~~ the sum axis and again into 4 equal parts along ~~based on~~ the hue axis so as to provide 32 spatial regions[[,]];

dividing the third diff region into 4 equal parts along ~~based on~~ the sum axis and again into 16 equal parts along ~~based on~~ the hue axis so as to provide 64 spatial regions[[,]];

dividing the fourth diff region into 4 equal parts along ~~based on~~ the sum axis and again into 16 equal parts along ~~based on~~ the hue axis so as to provide 64 spatial regions[[,]]; and

dividing the fifth diff region into 4 equal parts along ~~based on~~ the sum axis and again into 16 equal parts along ~~based on~~ the hue axis so as to provide 64 spatial regions.

7. (Amended) The method of claim 1, wherein the diff values range from 0 to 255, and diff values 6, 20, 60, and 110 are preselected to divide the color space along the diff axis such that the color space is divided into 5 regions based on the preselected diff values, wherein the color space is divided into 128 spatial regions by:

dividing the lowest or first diff region into 16 equal parts along ~~based on~~ the sum axis so as to provide 16 spatial regions[[,]];

dividing the second diff region into 4 equal parts along ~~based on~~ the sum axis and again into 4 equal parts along ~~based on~~ the hue axis so as to provide 16 spatial regions[[,]];

dividing the third diff region into 4 equal parts along ~~based on~~ the sum axis and again into 8 equal parts along ~~based on~~ the hue axis so as to provide 32 spatial regions[[,]];

dividing the fourth diff region into 4 equal parts along ~~based on~~ the sum axis and again into 8 equal parts along ~~based on~~ the hue axis so as to provide 32 spatial regions[[,]]; and

dividing the fifth diff region into 4 equal parts along ~~based on~~ the sum axis and again into 8 equal parts along ~~based on~~ the hue axis so as to provide 32 spatial regions.

8. (Amended) The method of claim 1, wherein the diff values range from 0 to 255, and diff values 6, 20, 60, and 110 are preselected to divide the color space along the diff axis such that the color space is divided into 5 diff regions based on the preselected diff values, wherein the color space is divided into 64 spatial regions by:

dividing the lowest or first diff region into 8 equal parts along ~~based on~~ the sum axis so as to provide 8 spatial regions[[,]];

dividing the second diff region into 4 equal parts along ~~based on~~ the sum axis and again into 4 equal parts along ~~based on~~ the hue axis so as to provide 16 spatial regions[[,]];

dividing the third diff region into 4 equal parts along ~~based on~~ the sum axis and again into 4 equal parts along ~~based on~~ the hue axis so as to provide 16 spatial regions[[,]];

dividing the fourth diff region into 2 equal parts along ~~based on~~ the sum axis and again into 8 equal parts along ~~based on~~ the hue axis so as to provide 16 spatial regions[[,]]; and

dividing the fifth diff region into 8 equal parts along ~~based on~~ the hue axis so as to provide 8 spatial regions.

9. (Amended) The method of claim 1, wherein the diff values range from 0 to 255, and diff values 6, 60, and 110 are preselected to divide the color space along the diff axis, such that the color space is divided into 4 diff regions based on the preselected diff values, wherein the color space is divided into 32 spatial regions by:

dividing the lowest or first diff region into 8 equal parts along ~~based on~~ the sum axis so as to provide 8 spatial regions[[,]];

dividing the second diff region into 4 equal parts along ~~based on~~ the sum axis and again into 4 equal parts along ~~based on~~ the hue axis so as to provide 16 spatial regions[[,]];

dividing the third diff region into 4 equal parts along ~~based on~~ the hue axis so as to provide 4 spatial regions[[,]]; and

dividing the fourth diff region into 4 equal parts along ~~based on~~ the hue axis so as to provide 4 spatial regions.

10. (Amended) The method of claim 1, wherein the diff values range from 0 to 255, and diff values 9, 29, and 75 are preselected to divide the color space along the diff axis such that the color space is divided into 4 diff regions based on the preselected diff values, wherein the color space is divided into 32 spatial regions by:

dividing the lowest or first diff region into 8 equal parts along ~~based on~~ the sum axis so as to provide 8 spatial regions[[,]];

dividing the second diff region into 2 equal parts along ~~based on~~ the sum axis and 4 equal parts again along ~~based on~~ the hue axis so as to be provide 8 spatial regions[[,]];

dividing the third diff region into 4 equal parts along ~~based on~~ the sum axis and into 3 equal parts along ~~based on~~ the hue axis so as to provide 12 spatial regions[[,]]; and

dividing the fourth diff region into 2 equal parts along ~~based on~~ the sum axis and 2 equal parts along ~~based on~~ the hue axis so as to provide 4 spatial regions.

11. (Amended) The method of claim 1, wherein the diff values range from 0 to 255, and diff values 9, 29, and 75 are preselected to divide the color space along the diff axis, such that the color space is divided into 4 diff regions based on the preselected diff values, wherein the color space is divided into 64 spatial regions by:

dividing the lowest or first diff region into 8 equal parts along ~~based on~~ the sum axis so as to provide 8 spatial regions[[,]];

dividing the second diff region into 4 equal parts along ~~based on~~ the sum axis and 4 equal parts along ~~based on~~ the hue axis so as to provide 16 spatial regions[[,]];

dividing the third diff region into 4 equal parts along ~~based on~~ the sum axis and 6 equal parts along ~~based on~~ the hue so as to provide 24 spatial regions[[,]]; and

dividing the fourth diff region into 4 equal parts along ~~based on~~ the sum axis and 4 equal parts along ~~based on~~ the hue axis so as to provide 16 spatial regions.

12. (Amended) The method of claim 1, wherein the diff values range from 0 to 255, and diff values 9, 29, and 75 are preselected to divide the color space along the diff axis, and the color space is divided into 4 diff regions based on the preselected diff values, wherein the color space is divided into 120 spatial regions by:

dividing the lowest or first diff region into 8 equal parts along ~~based on~~ the sum axis so as to provide 8 spatial regions[[,]];

dividing the second diff region into 4 equal parts along ~~based on~~ the sum axis and into 4 equal parts along ~~based on~~ the hue axis so as to provide 16 spatial regions[[,]];

dividing the third diff region into 4 equal parts along ~~based on~~ the sum axis and 12 equal parts along ~~based on~~ the hue axis so as to provide 48 spatial regions[[,]]; and

dividing the fourth diff region into 4 equal parts along ~~based on~~ the sum axis and 12 equal parts along ~~based on~~ the hue axis so as to provide 48 spatial regions.

13. (Amended) The method of claim 1, wherein the diff values range from 0 to 255, and diff values 9, 29, 75, and 200 are preselected to divide the color space along the diff axis such that the color space is divided into 5 diff regions based on the preselected diff values, wherein the color space is divided into 184 spatial regions by:

dividing the lowest or first diff region into 8 equal parts along ~~based on~~ the sum axis so as to provide 8 spatial regions[[,]];

dividing the second diff region into 4 equal parts along ~~based on~~ the sum axis and 8 equal parts along ~~based on~~ the hue axis so as to provide 32 spatial regions[[,]];

dividing the third diff region into 4 equal parts along ~~based on~~ the sum axis and 12 equal parts along ~~based on~~ the hue axis so as to provide 48 spatial regions[[,]];

dividing the fourth diff region into 4 equal parts along ~~based on~~ the sum axis and 12 equal parts along ~~based on~~ the hue axis so as to provide 48 spatial regions[[,]]; and

dividing the fifth diff region into 2 equal parts along ~~based on~~ the sum axis and 24 equal parts along ~~based on~~ the hue axis so as to provide 48 spatial regions.

14. (Amended) A color quantization method based on the HMMD color space, comprising:

dividing the color space ~~based on~~ into a plurality of differential values (diff) regions along the ~~a~~ diff axis; and

dividing each of the diff regions into 2^x equal parts along ~~based on~~ a sum axis and dividing each of 2^x equal parts into 2^y equal parts along ~~based on~~ a hue axis, wherein x and y are integers.

15. (Amended) The method of claim 14, wherein the diff values range from 0 to 255 for a color quantization level of 256 after division, and diff values 6, 20, 60, and 110 are

preselected to divide the color space into the plurality of diff regions such that the color space is divided into 5 diff regions, wherein the color space is divided into 256 spatial regions by:

dividing the lowest or first diff region into 32 equal parts along ~~based on~~ the sum axis so as to provide 32 spatial regions[[,]];

dividing the second diff region into 8 equal parts along ~~based on~~ the sum axis and 4 equal parts along ~~based on~~ the hue axis so as to provide 32 spatial regions[[,]];

dividing the third diff region into 4 equal parts along ~~based on~~ the sum axis and 16 equal parts along ~~based on~~ the hue axis so as to provide 64 spatial regions[[,]];

dividing the fourth diff region into 4 equal parts along ~~based on~~ the sum axis and 16 equal parts along ~~based on~~ the hue axis so as to provide 64 spatial regions[[,]]; and

dividing the fifth diff region into 4 equal parts along ~~based on~~ the sum axis and 16 equal parts along ~~based on~~ the hue axis so as to provide 64 spatial regions.

16. (Amended) The method of claim 14, the diff values range from 0 to 255 for a color quantization level of 128 after division, and diff values 6, 20, 60, and 110 are preselected to divide the color space such that the color space is divided into 5 diff regions, wherein the color space is divided into 128 spatial regions by:

dividing the lowest or first diff region into 16 equal parts along ~~based on~~ the sum axis so as to provide 16 spatial regions[[,]];

dividing the second diff region into 4 equal parts along ~~based on~~ the sum axis and 4 equal parts along ~~based on~~ the hue axis so as to provide 16 spatial regions[[,]];

dividing the third diff region into 4 equal parts along ~~based on~~ the sum axis and 8 equal parts along ~~based on~~ the hue axis so as to provide 32 spatial regions[[,]];

dividing the fourth diff region into 4 equal parts along ~~based on~~ the sum axis and 8 equal parts along ~~based on~~ the hue axis so as to provide 32 spatial regions[[,]]; and

dividing the fifth diff region into 4 equal parts along ~~based on~~ the sum axis and 8 equal parts along ~~based on~~ the hue axis so as to provide 32 spatial regions.

17. (Amended) The method of claim 14, wherein the diff values range from 0 to 255 for a color quantization level of 64 after division, diff values 6, 20, 60, and 110 are preselected to divide the color space such that the color space is divided into 5 diff regions wherein the color space is divided into 64 spatial regions by:

dividing the lowest or first diff region into 8 equal parts along ~~based on~~ the sum axis so as to provide 8 spatial regions[[,]];

dividing the second diff region into 4 equal parts along ~~based on~~ the sum axis and 4 equal parts along ~~based on~~ the hue axis so as to provide 16 spatial regions[[,]];

dividing the third diff region into 4 equal parts along ~~based on~~ the sum axis and 4 equal parts along ~~based on~~ the hue axis so as to provide 16 spatial regions[[,]];

dividing the fourth diff region into 2 equal parts along ~~based on~~ the sum axis and 8 equal parts along ~~based on~~ the hue axis so as to provide 16 spatial regions[[,]]; and

dividing the fifth diff region into 8 equal parts along ~~based on~~ the hue axis so as to provide 8 spatial regions.

18. (Amended) The method of claim 14, wherein the diff values range from 0 to 255 for a color quantization level of 32 after division, and diff values 6, 60, and 110 are preselected to divide the color space such that the color space is divided into 4 diff regions wherein the color space is divided into 32 spatial regions by:

dividing the lowest or first diff region into 8 equal parts along ~~based on~~ the sum axis so as to provide 8 spatial regions[[,]];

dividing the second diff region into 4 equal parts along ~~based on~~ the sum axis and 4 equal parts along ~~based on~~ the hue axis so as to provide 16 spatial regions[[,]];

dividing the third diff region into 4 equal parts along ~~based on~~ the hue axis so as to provide 4 spatial regions[[,]]; and

dividing the fourth diff region into 4 equal parts along ~~based on~~ the hue axis so as to provide 4 spatial regions.

Claims 19-40. (Canceled)

41. (New) A method of describing a color image using HMMD color space, comprising:

describing a color image using one of 256, 128, and 64 bins by:

quantizing the HMMD color space into five subspaces using the diff axis of the HMMD color space, wherein the diff axis intervals are defined by points:

[0,6], [6,20], [20,60], [60,110], and [110,255]; and

uniformly quantizing each subspace along the hue and sum axes of the HMMD color space.

42. (New) A method of describing a color image using HMMD color space, comprising:

describing a color image using one of 256, 128, 64, and 32 bins by:

quantizing the HMMD color space into at most five subspaces using the diff axis of the HMMD color space, wherein the diff axis intervals are defined by points:

[0,6], [6,20], [20,60], [60,110], and [110,255]; and

uniformly quantizing each subspace along the hue and the sum axes of the HMMD color space as follows:

Subspace	Number of quantization levels for different numbers of histogram bins							
	256		128		64		32	
	Hue	Sum	Hue	Sum	Hue	Sum	Hue	Sum
0	1	32	1	16	1	8	1	8
1	4	8	4	4	4	4		

2	16	4	8	4	4	4	4	4
3	16	4	8	4	8	2	4	1
4	16	4	8	4	8	1	4	1